

ABSTRACT

The present invention provides a template-directed self-assembly strategy to integrate the class of materials called dendrimers with periodic mesoporous and macroporous silica materials to create two totally new classes of organic/inorganic nanocomposite materials, which we call periodic mesoporous dendrisilicas (PMeDs) and periodic macroporous dendrisilicas (PMaDs). The unusual combination of inorganic silica and organic dendrimer chemical structures with these scales of porosity and surfaces suggests a myriad of uses for PMeDs and PMaDs, such as the controlled release and uptake of chemicals, chiral separations and catalysis, electronic printing and microelectronic packaging, biomaterial platforms, chromatography stationary phase, and photonic crystal applications. These applications target the synergistic relationship between the dendrimer and the meso- or macroporous structure within a single hierarchical nanostructured organic/inorganic hybrid material.